RI-9025 Safe Firing of Furnaces and Boilers

Safety Topic of the Month
Richmond Refinery

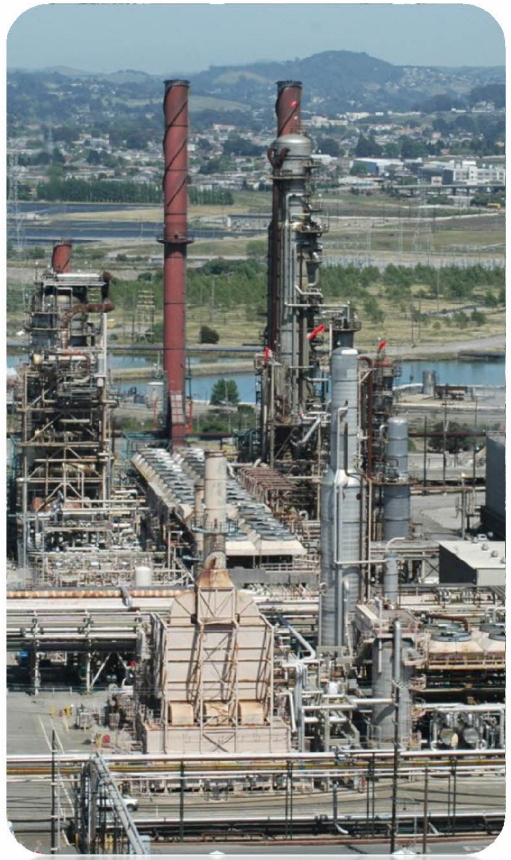
March 2010

 DOC ID

RI-9025
Safe Firing of Furnaces and Boilers

This Safety Topic of the Month reviews revisions to one of our RIs to make the revision easily accessible and provide a Refinery Wide learning opportunity.

- RI-9025 – Safe Firing of Furnaces and Boilers
- Affected Operations personnel have already received detailed training
  - Safety Topic is only an overview to highlight some key aspects of the RI
- Some recent incidents precipitated the current RI revisions and show why it's important:
  - F-100 (IPS 1424274)
  - F-651 relight (IPS 1142697)
  - F-1650 detonation (IPS 1128228)



Furnace Bogging (CO2 Breakthrough or Gassing Up)

- If you suspect a furnace or boiler is gassed up, never inspect firebox until fuel gas rate is cut back to slightly lower than fuel gas rate before suspected furnace bog began
  - When fuel gas has been cut back, CO should come down, O2 will go up, and furnace transfer temperature will go up - this indicates furnace is no longer gassed up.
- Opening peephole door of gassed up firebox provides O2 for unburned fuel to react with.
  - Can cause a flash back through the peephole causing possible injury.

When inspecting firebox, always verify furnace or boiler has a Negative Draft (at least 0.05 inches-water) before opening any peephole. Open peepholes from the side, keeping your head and arm away before looking inside.

CO or O2 Analyzer Out of Service

- Use PSM Database Bypass Safety Device process when CO or O2 analyzer is out of service
  - When either combustion analyzer is out of service or defective, define interim operating guidelines as contingency
  - Access process on Management of Change (MOC) webpage
    MOC webpage - see PSM Database

Hot Start up after Furnace or Boiler Trip.

PERFORM FOLLOWING CHECKS / NOTIFICATIONS BEFORE A HOT RESTART

1. Ensure all burners are individually blinded
2. Ensure pilots and waste gas burners (such as VOC systems) are individually isolated from firebox
3. Completely open stack damper and air registers
   - If furnace is equipped with fans, ensure they are running and dampers are open
4. Check that cause of furnace trip has been cleared
5. Notify CFD that you need firebox sniffed for hydrocarbons
   - Be sure to inform CFD that box is hot - their hot sniffing element is accurate up to 850 degrees F
6. Check that Fail Safe Controllers (FSC) and valves are reset

Purging Firebox After Furnace or Boiler Trip

- Purge firebox to ensure combustible-free atmosphere for light-off
  - Default purge time is 15 minutes
    - Time required for 3 firebox volume turnovers as specified for design of steam purge systems per API 560 for natural draft heaters
    - Fired heaters with fans may be designed to purge in less time; if so, purge time can be 15 minutes or whatever manufacturer specifies
- Purging hot box may be accomplished using:
  - Snuffing steam
  - Fans (if furnace has them)
  - Natural draft - if furnace is hot enough to produce a draft of 0.1 inches of water at arch (just below convection section)
- After purging firebox, have CFD test it for combustibles using hot sniffing element
  - All sample readings must be within nil to 1 percent range of lower explosive limit

Hot Start up after Furnace or Boiler Trip

- For sample readings exceeding 1 percent:
  - Find source of fuel leakage into firebox and correct problem. Once corrected,
  - After purging, repeat testing requirements until all sample readings are within nil to 1 percent range.
- When gas testing is complete, hang "Gas Test OK" tag at location of first burner/pilot to be lit
- Reset fuel gas chopper valves if they are not yet re-latched.
- Light off hot firebox using same procedure as for a cold firebox.

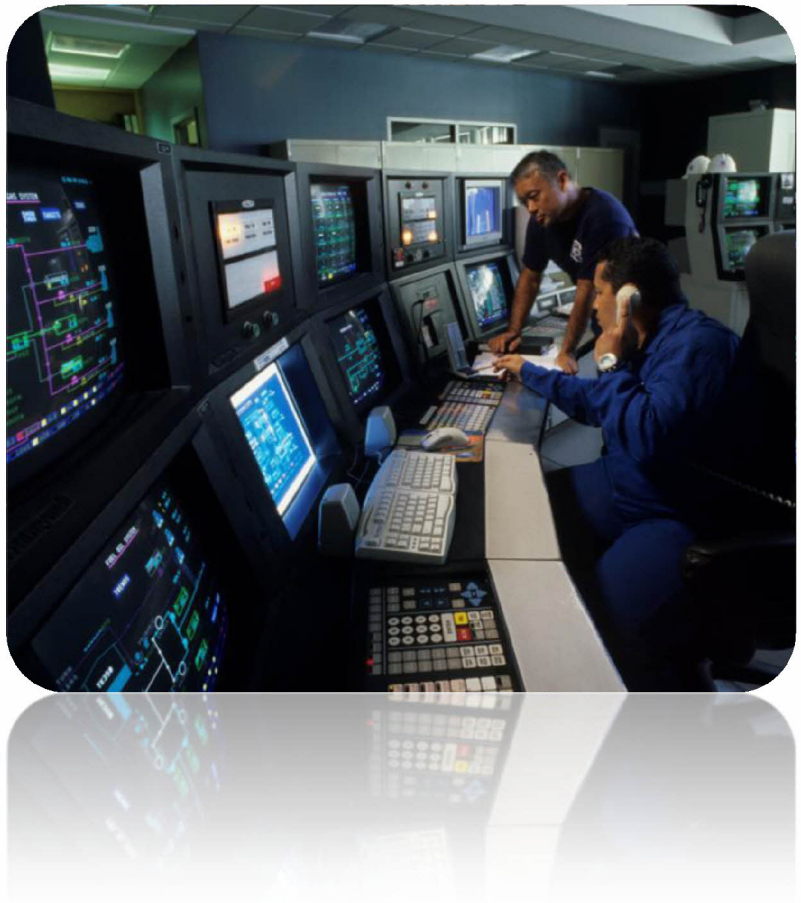
Every Task, The Right Way, Every Time

Discussion

1. What are some of the barriers the group or crew feel may prevent us from completing Every Task, the Right Way, Every Time?
2. Take a moment to select a job that your work group or crew is responsible for, then discuss the ways that you ensure that you don't "short cut" the procedures.
3. Discuss the potential for incident and or injury when procedures are not followed exactly every time. Have the crew or group come to an agreement about their commitment to following procedures – Every Task, the Right Way, Every Time.

Review TOP Lessons Learned

Learning from our past incidents will help us prevent them in the future. Please take a few minutes now to review the TOP lessons learned.



TOP Lessons Learned